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# Mountain Water
for
San Francisco

Proposition of

Bay Cities Water Company

To Bring Water from the

Sierra Nevada Mountains

# Mountain Water
for
San Francisco

A COMMUNICATION

FROM

BAY CITIES WATER COMPANY

TO THE

Board of Supervisors of the City and County of San Francisco

PROPOSING A

SOURCE OF WATER SUPPLY

IN THE

SIERRA NEVADA MOUNTAINS

FILED AT CITY HALL
AUGUST, 1905

BAY CITIES WATER COMPANY

CAPITAL, $10,000,000

⁂

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A MUNICIPAL WATER SUPPLY FROM THE AMERICAN-COSUMNES WATERSHEDS

OFFICE OF
BAY CITIES WATER COMPANY.

SAN FRANCISCO, August 23, 1905.

To the Honorable, the Board of Supervisors of the City and County of San Francisco, California.

GENTLEMEN:—As a source upon which, with paramount advantage, San Francisco may draw to supply its present and future water requirements, BAY CITIES WATER COMPANY, a corporation under the laws of California, respectfully invites the attention of your Honorable Body to the region known as the upper watersheds of South Fork of American River and North Fork of Cosumnes River, in El Dorado, Amador and Alpine Counties, California.

The region above referred to comprises a superficial area of 403.98 square miles; and is bounded by a line extending from a point on North Fork of Cosumnes River, about eight miles southeast of Placerville, in El Dorado County, known as Buck's Bar, easterly about forty miles to the summit of the Sierra Nevada mountain range; thence northerly, following the summit of the range, about twenty miles to the Lake Tahoe region; thence southwesterly, following the mountain range constituting the divide between Silver Creek and South Fork of American River, a distance of about eighteen miles to the confluence of South and Silver Forks of American River; thence, following South Fork of American River, westerly about twenty miles to a point opposite Pacific House, which is about eighteen miles east of Placerville on the old Placerville-Virginia City stage road; thence southwesterly, following the mountain range forming the divide between Webber Creek and North Fork of Cosumnes River, to Buck's Bar.

Reference to the accompanying map makes it clearly apparent that the two watersheds above referred to and described, united as later suggested, will form a symmetrical body: The American River sheds (area 242.58 square miles), terminating opposite Pacific House at an elevation of about 3800 feet, joining those of the Cosumnes River (area 161.40 square miles), terminating at Buck's Bar at elevation about 1500 feet, and rendering it practicable to concentrate all of the waters of both sheds at that point.

The character of the entire drain area is that which is common to the high Sierra Nevada Mountains. Its minimum elevation is 1500 feet above mean sea level at Buck's Bar, and its maximum 10,430 feet at the summit of Round Top Mountain, its average elevation being about 6500 feet above San Francisco base.

The surface is made up of bare granite masses presenting clean precipitous surfaces interspersed with areas of pine timber. There is a notable absence of soil and undergrowth. The higher mountains abound in banks of perpetual snow. The United States geological map shows the territory to contain more than fifty natural lakes, beside innumerable springs and perennial mountain streams.

The vegetation on the watersheds gives irrefutable evidence of abundant and uniform precipitation. About 67 per cent of the entire area is within that zone, which, according to the investigations of Mr. Marsden Manson, C. E., has a mean annual rainfall of over sixty inches; the remainder, except about five per cent, lies within the zone having fifty or more inches of rain.

The rule established by Mr. C. E. Grunsky, C. E., for determining quantities of water draining from high Sierra water sheds, when applied to the best obtainable data of the drain area referred to, shows conclusively that if the water originating upon, and draining from this region is properly conserved, the quantity is sufficient to supply the requirements of a population of over three and one-half million people; while investigations which have been made make it clearly apparent that reservoir capacity ample to withstand a daily draft of two hundred million gallons of water, is readily and economically procurable.

To a large degree the water rights essential to the use of the region referred to as a source for supplying water to San Francisco have been in private ownership and use for about forty years, as also have large parts of the properties which would enter into the supply system. The titles therefore, are above question.

It is estimated that more than two million dollars have been expended upon the properties, dams having been constructed for controlling the discharge of water from several of the lakes; and ditches, tunnels, flumes, etc., have been built for conducting it to points of use. These improvements are largely such as would be required if the properties were owned and being utilized by the city as a source of water supply, hence serve to reduce the investment necessary for that purpose.

As at present improved the lakes utilized as reservoirs, even during a recurrence of the most serious period of drought known to California, have ample storage capacity to withstand a daily draft of fifty million gallons of water; or, on the basis of 80 gallons per capita per day, to supply a population of 625,000 people. And disregarding the investment involved in conducting the water to, and distributing it in the city, can be made equal to the requirements of a population of 950,000 to 1,000,000 at a very moderate cost.

The improvements now existing upon the properties consist of dams and headgates at Silver, Echo and Medley Lakes; and of the flumes, tunnels, canals and ditches which are required to concentrate the discharge of the lakes, and the flow of the many streams encountered on the way, in the channel of South Fork of American River at the mouth of Silver Fork. Also of a diversion dam across South Fork of American River just below the mouth of Silver Fork, and of a canal about 20 miles in length extending from the diversion dam to the site (opposite Pacific House) chosen for a tunnel to unite the two watersheds.

If the generation of electric power for the city's use be not considered, the only work necessary to be done to concentrate a daily supply of 50,000,000 gallons of water at a desirable point, is the driving of the tunnel to connect the two watersheds. This tunnel, it has been estimated, can be built at an outlay of less than forty thousand dollars.

The tunnel being built, the waters flowing through it would follow natural channels to a point on North Fork of Cosumnes River, convenient for entrance to pipe lines leading to the city. This point is about seven miles south of Placerville, and, as the pipe line would run, about 123 miles from San Francisco, or nearly 13 miles closer to the city than the intake points considered by Mr. Grunsky in connection with a water supply from the Tuolumne River.

It is self-evident that waters procured from the American-Cosumnes region must possess all of the well-known characteristics of the waters of the high Sierras. These sweet and sparkling waters, originating in the eternal snows, are too well and too favorably known to require either comparison with other waters or commendation or defense.

Tentative plans for the utilization by the city of the waters from the American-Cosumnes region have been made, and estimates of the cost to the city of acquiring and improving these sources of supply have been compiled. In these estimates broad factors of safety have at all times been employed in every respect. And it is confidently believed that should the city acquire and thereafter improve and utilize this suggested source of water supply, the results, as to quantity of water obtained, quantity of power developed, and total cost of development would be much more favorable than the estimates show.

The tentative plans referred to are based upon providing and delivering to the city a regular daily supply of seventy-five million gallons of water; of developing from the waters before they enter the pipe lines leading to the city, about 8,400 horse power of electrical energy; of transmitting the electric power to the city, and of providing the city with a water distributing system such as Mr. Grunsky designed and estimated upon in connection with the Tuolumne proposition. Such plans include the following improvements:

1. The tunnel uniting the American and Cosumnes watersheds.

2. The construction of a relay reservoir in the Cosumnes watershed to contain three thousand million gallons of

water. This is not a necessity, but is regarded as a prudent provision against possible accident.

3. The building of a diversion dam in the Cosumnes Canyon for the purpose of diverting the waters from the stream bed into a canal, rendering possible the generation of power when the waters are returned, through pressure pipes, to the intake of the pipe lines leading to the city.

4. A tunnel leading from behind the diversion dam into a canal, and a canal extending a distance of about seven miles along the side of the Cosumnes Canyon, to a point above the site chosen for the power house and the pipeline intake.

5. The pressure pipes, power house, hydraulic machinery and electrical apparatus to generate 8,400 horse power. Also the pole and wire lines required to transmit it to San Francisco.

6. Two steel or iron pipes for conducting water to San Francisco, each 48 inches in diameter and extending between the intake point and the city.

7. Relay reservoirs near the city to provide storage for sufficient quantities of water near at hand, to guard against possible interruptions of service.

8. A duplication of the city water distributing system, including all mains, pipes, tanks, pumping stations, etc., estimated upon by Mr. Grunsky in his report upon the Tuolumne region as a source of water supply for San Francisco. (Munic. reports, 1902-3, p. 402 *et seq.*)

The figures arrived at in the estimate upon the American-Cosumnes region as a source of water supply are as follows:

Cost of all properties required at and above power house site and intake of pipe lines leading to San Francisco, and of all tunnels, dams, canals, pipe lines, power house, hydraulic machinery, electrical apparatus, etc..	$ 9,150,000
Cost of 123 miles of double, 48-inch pipe lines, extending from intake point to San Francisco, being the amount Mr. Grunsky estimates as the cost of 135.8 miles of similar pipe from the Tuolumne, or 12.8 miles of double pipe line in excess of that required from the American-Cosumnes.............	18,800,000
Cost of relay reservoirs located on pipe lines but on the west side of the San Joaquin Valley..	1,600,000
Cost of power transmission and telephone lines (adopted from Mr. Grunsky's report)......	126,700
TOTAL COST OF SUPPLY SYSTEM, INCLUSIVE OF PIPE LINES TO THE CITY AND OF POWER PLANT AND TRANSMISSION LINES	$29,676,700
Cost of city distributing system (adopted from Mr. Grunsky's report).....................	8,807,000
TOTAL ESTIMATED COST OF AMERICAN-COSUMNES SUPPLY SYSTEM, OF CAPACITY TO DELIVER 75 MILLION GALLONS OF WATER PER DAY TO SAN FRANCISCO, AND OF A CITY DISTRIBUTING SYSTEM PER MR. GRUNSKY'S PLANS AND ESTIMATES	$38,483,700

According to Mr. Grunsky's report above referred to, the cost of a system to supply San Francisco with 60 million gallons of water per day from the Tuolumne region, exclusive of cost of distributing system in the city, would be $30,724,000, or at the rate of $512,066 per million gallons of daily supply capacity. While the cost of a similar system supplying 75 million gallons of as good or better water from the American-Cosumnes region would be $29,676,700, which is at the rate of $395,689 per million gallons of daily supply capacity.

The value of the Spring Valley Water Company's supply and distribution system, as established by the expert testimony given in the pending water rate case (average of values testified to by Herman Schussler, C. E., Rudolph Hering, C. E., Frederick P. Stearns, C. E., and Arthur L. Adams, C. E.), is $47,500,000; and the capacity thereof similarly testified to is 35,000,000 gallons of water per day.

Mr. Schussler estimates the value of Spring Valley's distributing system (Munic. reports, 1904, p. 586) at $10,725,000. Deducting this latter sum from the entire value as above given establishes the value of the supply system at $36,775,000, or say at $1,050,714 per million gallons of water per day. Tabular comparisons of the preceding figures show as follows:

COMPLETE SYSTEMS COMPARED.

Spring Valley System, Experts' value........	$47,500,000
Tuolumne System, Grunsky's estimate.........	39,531,000
American-Cosumnes System	38,483,700
Spring Valley excess over Tuolumne..........	7,969,000
" " " " American-Cosumnes .	9,016,300
Tuolumne " " "	1,047,300

COST PER MILLION GALLONS DAILY CAPACITY COMPARED.

(Supply Systems only.)

Spring Valley	$ 1,050,714
Tuolumne	512,066
American-Cosumnes	395,689
Spring Valley excess over Tuolumne..........	538,648
" " " " American-Cosumnes .	655,025
Tuolumne " " "	116,377

CAPACITY IN GALLONS PER DAY COMPARED.

(Supply Systems only.)

American-Cosumnes	75,000,000	gallons
Tuolumne	60,000,000	"
Spring Valley	35,000,000	"
American- Cosumnes excess over Spring Valley	40,000,000	"
American-Cosumnes excess over Tuolumne	15,000,000	"
Tuolumne excess over Spring Valley....	25,000,000	"

Portions of the American-Cosumnes property above described are those which are referred to in the communication to your Honorable Body under date of April 25, 1905, signed by Mr. Edward F. Cragin. Those properties, as well as the others considered herein, are now entirely in the control of Bay Cities Water Company, and are respectfully called to your attention, and you are respectfully asked to cause the same to be examined for the purpose of determining their availability and desirability for the purpose of providing San Francisco with a permanent supply of the best water obtainable in the Sierra Nevada Mountains.

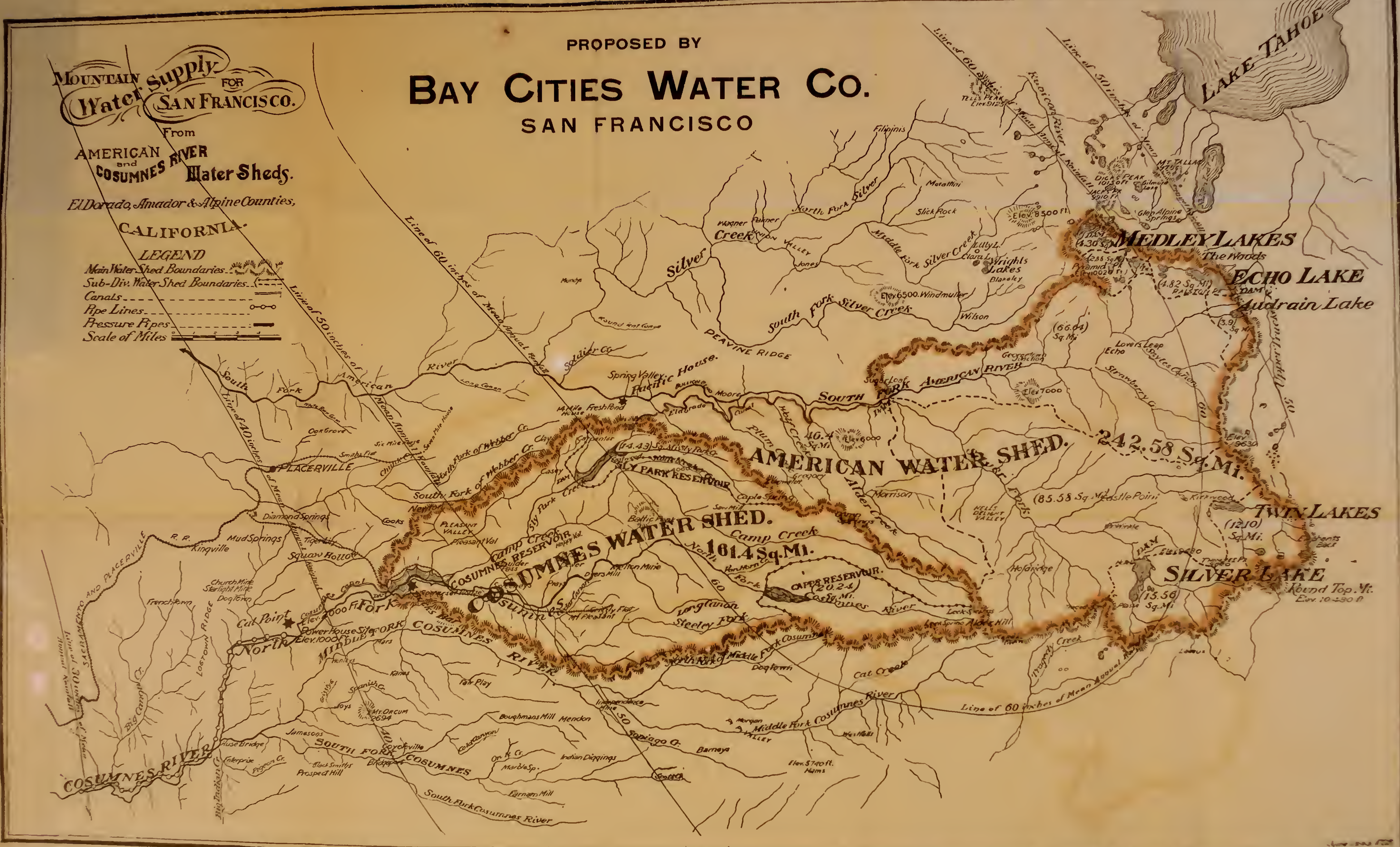
Awaiting the pleasure of your Honorable Body and its agents and representatives, and holding ourselves entirely at your and their command,

Respectfully submitted,

BAY CITIES WATER COMPANY.

By William S. Tevis, *President.*

LAKE TAHOE
TALLAC
allen Leaf L.
June 1905 F.C.B.



PROPOSED BY

BAY CITIES WATER CO.

SAN FRANCISCO

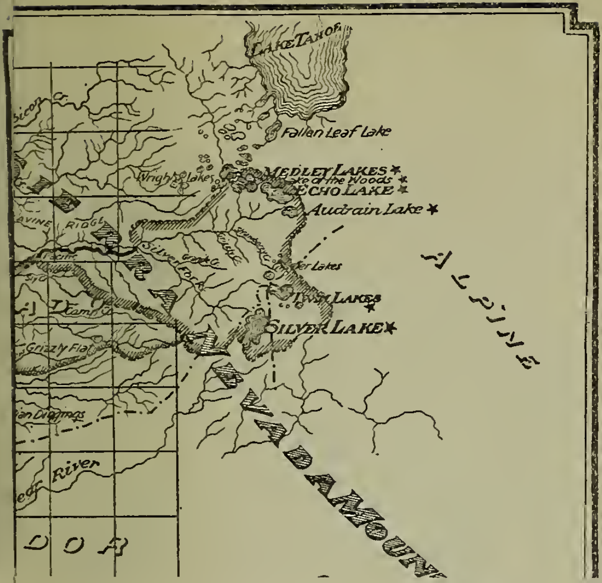
MOUNTAIN Water Supply FOR SAN FRANCISCO.

From

AMERICAN and COSUMNES RIVER Water Sheds.

El Dorado, Amador & Alpine Counties,

CALIFORNIA.


LAKE TAHOE
Fallen Leaf Lake
...bicon Cr.
Wright's Lakes
MEDLEY LAKES
Lake of the Woods
ECHO LAKE
Audrain Lake
...AVINE RIDGE
Silver Creek
Silver Fork
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TWIN LAKES
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Pacific
Grizzly Flat
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ALPINE
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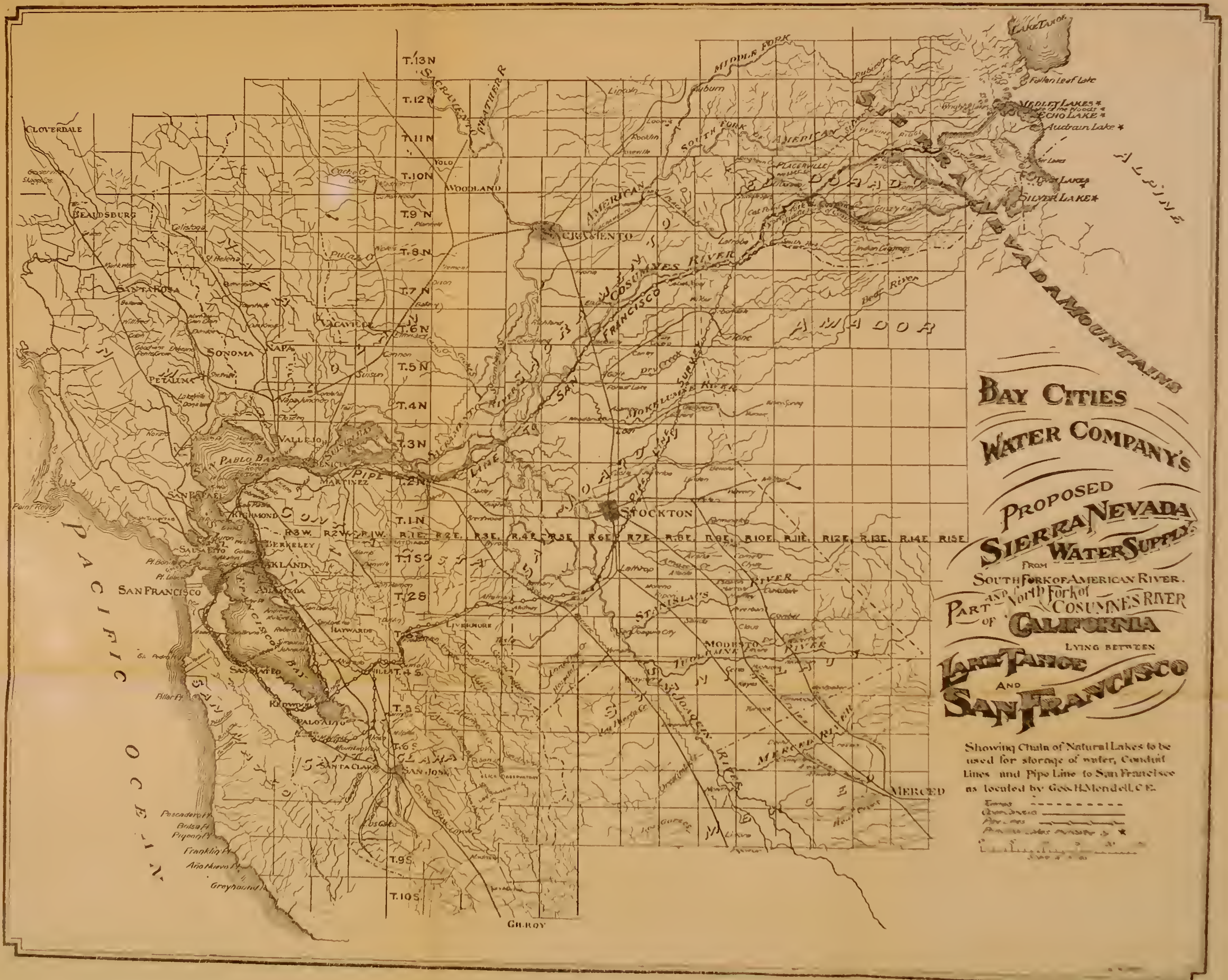

BAY CITIES WATER COMPANY'S PROPOSED SIERRA NEVADA WATER SUPPLY FROM SOUTH FORK OF AMERICAN RIVER AND NORTH FORK OF COSUMNES RIVER PART OF CALIFORNIA LYING BETWEEN LAKE TAHOE AND SAN FRANCISCO

Showing Chain of Natural Lakes to be used for storage of water, Conduit Lines and Pipe Line to San Francisco as located by Geo. H. Mendell, C.E.

# Sierra Nevada Water
for
San Francisco